The band calculations, on which our understanding of electronic properties are based, preferably ignore the atoms. Many attempts to derive band structures from the properties of constituent atoms by tight binding or LCAO methods have sadly failed. There has grown the general belief that reasonable results can be reached by some plane-wave methods only, where the atomic properties have no role. This is the situation where this book enters the game.

This book is the first extensive and quantitative apology of the chemical or atomic view on band theory. It boldly opposes the general opinion of solid-state physics. True, dating from 1974, it is no longer quite up to date in its details. However, it still deserves attention today. In the present hasty times one seldom meets books which are so carefully considered in their structure and all details. The book starts with an introduction to the basic theory at a level which brings it within the reach of a newcomer. It proceeds logically, explains every step clearly and thoroughly and displays honestly the physical argumentation, motivation and consequences of the assumptions and approximations, which are so often omitted and left to the headache of the reader.

The book is concentrated merely on elements with diamond structure and on the related partially covalent crystals with ZnS structure. In spite of this restriction it is instructive in a general sense. It gives a coherent presentation of the methods and ideas followed and may thus give impulses to new applications and developments.

The main approach is the 'equivalent orbital' or EO LCAO method. The bonds are described in terms of symmetry-related local orbitals, and the band structure resulting from the corresponding Bloch functions is discussed. Band widths, gaps and other critical measures of the band structure are expressed in terms of several Coulomb and resonance integrals, which – on the assumption that 'matter is made of atoms' – are related to spectroscopic and thermodynamic data on the atoms and structurally-related molecules. This makes the treatment both semiempirical and semiquantitative, but, on the other hand, it gives a simple and astonishingly consistent explanation of many known properties of the crystals. It is able to produce, in a simple parametric form, plausible explanations for both the systematic behaviour and the lack of it, either horizontally as a function of ionicity or vertically as a function of the atomic masses.

As minor points of criticism, one may note some unconventional use of terms *e.g.* 'self consistent' instead of 'self adjoint' or 'Hermitian' and 'associated' instead of 'augmented' plane waves for APW; also some non-standard notations are used. The list of references is impressive. It gives a good view also of the Russian literature in the field. It is also interesting to see how many western books are available in Russian translation, although in case of real need a western reader might prefer a reference to the original.

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Neutron diffraction. Edited by H. DACHS. Pp. xiii + 357. Berlin-Heidelberg-New York: Springer-Verlag, 1978. Price DM 65·00, $32.50.

The reviewer [*Acta Cryst.* (1976). A**32**, 749] of a new edition of another volume of this same title discussed the advantages and disadvantages of employing a single author or an edited group to write on what is now such an extensive topic as 'neutron diffraction'. At first sight the appearance of this volume edited by Professor Dachs might suggest that students of the subject will now be able to make their own detailed comparison of the two approaches. However, this is not really the case, predominantly for two reasons. First, the present book has taken a stricter view of the word 'diffraction' and does not, for example, stray into incoherent inelastic-scattering studies. Secondly, the point of view is very close to the Institut Laue–Langevin and its highly-developed modern practices and it is rather a far cry from the beginner with no more than a medium-flux reactor and possibly ageing instruments. Indeed, as the editor says, there is a specific intention 'to stress the technical aspects of the subject'.

The book has nine chapters, each by a separate author, and the coverage may be gleaned from the following shortened titles: *Principles*; *Polarized neutrons*; *Combination of X-ray and neutron data*; *Magnetic structures*; *Disordered structures*; *Phase transitions and critical phenomena*; *Biological problems*; *Liquid structure*; *Dynamical neutron diffraction.* All of these are fields in which rapid progress is being made at the present time. Each chapter is a competent review and contains an immense amount of information: they are all well-furnished with up-to-date references, totalling over seven hundred in the book as a whole. Inevitably some of the chapters are better than others and the reviewer is particularly impressed by Hayter's review of polarized neutron techniques, Coppens's meticulous and extremely clear account of X–N methods and the final chapter by Rauch & Petrascheck on dynamical neutron diffraction. These chapters seem especially valuable for the way in which they gather together diverging strands of scattered publications in the best tradition of a review article. Quite apart from their technical content, the nine chapters differ immensely in style, ranging from a high literary standard to a presentation which sometimes verges on the colloquial. It is difficult to accept that the term 'neutron scatterer' can include not only atoms and magnetic moments but also the experimenter himself.

For a scientific publication the book, which is in offset printing, has an exceptionally large number of errors and misprints. In some of the chapters no checking of the text seems to have taken place and it is a great pity that authors who so valiantly write in a tongue other than their native one should suffer in this way. Spelling mistakes are not uncommon, pairs of letters are reversed, singulars and plurals are confused, prepositions are wrongly used, authors' names are mis-spelt. At best, these blemishes merely irritate the reader but it is difficult not to wonder whether there may not also be errors in factual data. Here a reviewer can only note what offends his memory as he reads – but certainly the

spin of a proton is not unity, fission energies are not measured in millielectron volts, U^{234} is not of significance, the scattering length of hydrogen is not $-0{\cdot}30 \times 10^{-14}$ m and bond lengths of 'several hundreds of ångströms' are surprising.

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Structures in nature as a strategy for design. By P. PEARCE. Pp. xvii + 245. Cambridge, Mass: MIT Press, 1978. Price £31·50.

The author has produced an illustrated manual of geometry with useful descriptions of many varieties of polyhedra and their ordered combinations into finite and infinite assemblies. Polyhedra are addictive, and people hooked on them tend to loose all sense of proportion (also in the architectural sense). This is a pattern-book for such addicts.

Crystallographers will indeed find this thesaurus of absorbing interest. The least familiar but most important section deals with structures composed of membranes or minimal surfaces slung over space frames. Most of the matter has been published elsewhere but the collection is nevertheless useful, although many of the illustrations and descriptions are very hard to understand. However, crystallographers will be better placed than others and should derive useful insights into complex spatial structures. The geometry seems mostly sound but the engineering is vestigial and the architecture naive – who wants to live in a house designed like a polyhedral virus? If we have no forces but the forces between atoms, why should the geometry of atomic structures be scaled up when the forces cannot be scaled up?

Unaccountably, the bibliography (which is worthwhile) only goes up to about 1970, since when much of relevance has appeared, for instance, in the *Journal of Ultrastructure Research* and the *Journal of Molecular Biology*.

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Рентгеноструктурный анализ библиографический указатель литературы за 1960–1975 гг. М. М. УМАНСКИЙ. **(X-ray Structure Analysis: a Bibliography, 1960–1975.** By M. M. UMANSKIJ. Pp. 174. Leningrad: Leningrad Scientific Publishing Co., 'Burevestnik', 1978.) Price, 1 rouble 13 kopec.

This little book is a fairly comprehensive bibliography of textbooks and articles on X-ray crystallography over the past two decades or so.

Although addressed to readers of Russian, it would undoubtedly have real value, for reference purposes, for any English-reading scientist, since over half of all the entries are, in fact, in English.

The book is in two parts. Part I (34 pp., 174 entries) lists books; part II (140 pp., 1350 entries) lists scientific papers. The booklist is itself divided into two sections: textbooks proper (121 books) and reference books or tables (53 entries); but, in contrast to the subject-subdivision of the papers (see below) the books are not collected into subject areas at all, presumably because the selection has been rather narrowly limited to explicitly crystallographic titles. The scientific papers are divided up into sections according to their subject matter. In each of these sections (22 in all) the ordering of the entries is the same: first, all the Russian-language titles are given, in Russian script, the listing being in chronological order, starting from the earliest, usually a little earlier than 1960, and finishing at about 1975; then all the non-Russian entries (almost all are in English) are given in Latin script, again in chronological order from about 1960 to late 1975. The topics into which these papers are divided include, for example, *Monochromatization*; *Diffractometers* (this is the largest section: 166 entries); *Indexing of photographs*; *Precision measurement of lattice parameters*; *Investigation of texture*; and so on. The largest single topic is, *Theory and methods of structure determination*: this embraces five sections, totalling 265 papers.

Part I, which is the list of book titles, has an interesting feature. This is the inclusion, in many cases, of a short paragraph of commentary (in Russian) below particular book titles. Also, any multi-author collection has all of its section titles and their authors listed in full (in English). These commentaries must be quite useful for the Russian language readers for whom this book is intended.

The standard of production of this book is not very good, with variable quality of print, and not-infrequent typographical errors; but it is inexpensive. As for the matter of the cut-off date, about the end of 1975, Professor Umanskij is currently hoping that a Supplement covering the period 1976–1978 will be produced before the end of 1979.

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Books Received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

An introductory guide to information sources in physics. By L. R. A. MELTON. Pp. ii + 44. London and Bristol: The Institute of Physics, 1978. Price £1·25 (or 90p per copy for 10 copies or more). This is a booklet of advice for students on how to use library facilities.

Semi-metals & narrow-bandgap semiconductors. By D. R. LOVETT. Pp. viii + 256, Figs. 149, Tables 26. London: Pion Limited, 1977. Price £8·50, US $17.50. A review of this book, by T. Okada, has been published in the April issue of *Journal of Applied Crystallography*, page 262.